An Assessment of Seven Strategic Issue-Areas in the Development of a Regional WDM Program

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Abstract

In keeping with the commitment that the IUCN has to sustainable development, a series of scientific studies have been conducted in the water sector. These have focused specifically on Water Demand Management (WDM), and are all intended to eventually contribute to the development of a set of guidelines for the development of policy at the regional level. This paper deals with one of the components of the overall IUCN process, which isolated seven strategic issue-areas that will need to be addressed when WDM policy guidelines are formulated for the whole SADC Region.

These seven issue areas are:

- Acceptance that diversity is the norm.
- The need to focus on institutional development.
- The need to focus on data generation, flow and management.
- The impact of the broader socio-economic setting.
- Political will as a key determining factor.
- Windows of opportunity.
- Incremental implementation of WDM as a critical success factor.

This paper summarizes the findings of the Analytical Paper that was commissioned under Phase II of the IUCN Water Demand Management Program for Southern Africa in an attempt to bring the contents to the attention of the water sector at the regional level.

1. Introduction

The IUCN study entitled "*Water Demand Management: Towards Developing Effective Strategies for Southern Africa*" (Goldblatt *et al.*, 1999) drew a number of conclusions, two of which are of direct relevance to this Analytical Paper. The first conclusion was that, "one of the critical outcomes … has been the realization that so far, WDM is not an intrinsic part of water resource planning and management at the national and regional levels in Southern Africa" (Goldblatt *et al.*, 1999:11). The second conclusion was that "WDM … needs to be seen within a regional context" (Goldblatt *et al.*, 1999:19). It is the intention of this paper to summarize the work that was commissioned by the IUCN as part of Phase 2 of their WDM Program in Southern Africa by focusing on a basic model

and seven strategic issue areas that were developed in the Analytical Paper entitled "*WDM As A Concept and a Policy: Towards the Development of a Set of Guidelines for Southern Africa***"** (see Turton, 2002a).

2. The Implications of Basin Closure on Water Management Institutions

Basin closure is a useful concept that is central to our understanding of the *problematique* of WDM as both a concept and a policy. A river basin with no utilizable outflow of water is a closed basin (Seckler, 1996). A river basin is said to be facing closure when all of the available water has been allocated to some productive activity and there is no more water left to be allocated (Svendsen *et al.*, 2001:184). This means that issues such as sectoral water efficiency (SWE) become increasingly important as basin closure is reached, so consequently decisions regarding the inter-sectoral and intra-sectoral allocative efficiency of water become relevant. This in turn implies that competition increases between users making the allocative decisions increasingly politicized, particularly when this allocation is between sovereign states, calling for a robust conflict resolution mechanism such as effective regimes in international river basins (Turton, 2002b:13). This differs from the hydrological definition of the term where a closed basin is a basin that has an outflow into internal seas, lakes or other sinks (Wester *et al.,* 2001:161). ***Only when a river basin approaches closure, does WDM start to become relevant, so it is necessary to know where this threshold is in any given situation if we are to understand WDM as a concept and a policy more profoundly***.

Working on the development of the concept of basin closure, and in particular the changing institutional arrangements that are needed in order to manage this condition, Molden *et al.,* (2001:73-87) has developed a useful model (see Figure 1).

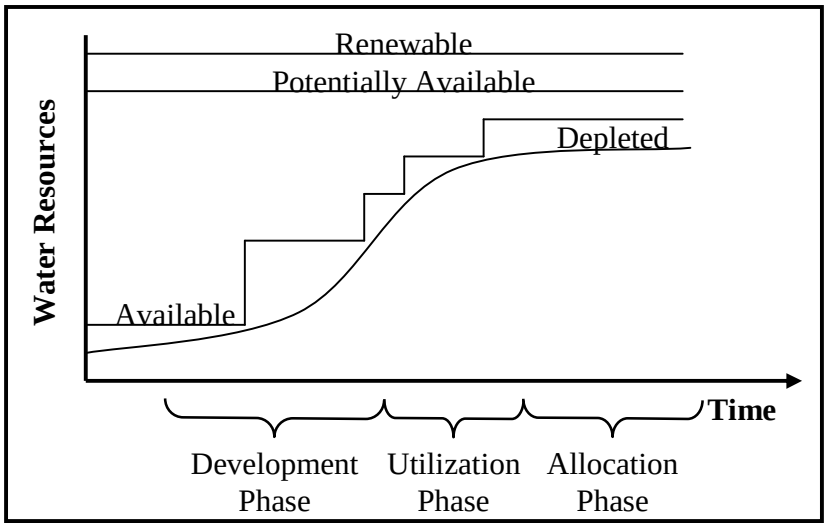

Figure 1. Phases of river basin development as envisaged by Molden *et al.*, (2001:77).

This model shows what happens as the water resources within a given river basin are developed for economic use over time. Their central hypothesis is that changing patterns of water use within a given river basin require "adaptive institutions" for the sustainable, equitable and productive management of water resources (Molden *et al.*, 2001:74). As the water resources are developed over time, the institutional arrangements needed to manage those resources change. According to Molden *et al.,* (2001:77-78) three distinct phases of institutional development can be isolated, each associated with a specific level of resource development, and consequently each needing a different set of rules, procedures and management priorities. These three phases consist of the following:

The Development Phase. This is found in the early stages of river basin development. During this phase, there is no scarcity of naturally occurring water, so the main emphasis is on developing the resources that exist in nature. Due to the abundant availability of water, the laws of economics dictate that it is not a scarce good and consequently the value is relatively low. ***As such WDM is not necessary at this time, and if introduced as a policy would probably fail***. Increasing demand for water results in increased development of infrastructure such as dams and pipelines. This starts to place an economic cost on water, but in general the economic value stays low due to its relative abundance. Institutional priorities at this stage are centered mainly on engineering-related issues (First-Order Focus).

The Utilization Phase. This starts to occur once there has already been significant development of the hydraulic infrastructure. As such there has been considerable economic cost involved in mobilizing water and guaranteeing the assurance of supply to a given level. In this phase efficiency starts to become an issue, so the institutional arrangement changes to adapt to this new management requirement. The institutions tend to focus on sectoral issues such as the management of irrigation projects or the supply of bulk water to domestic or industrial users. Scarcity is not yet a major problem, but the economic cost of water delivery starts to become a concern. Small new infrastructural projects are also developed as the depletion curve approaches the available curve, but these are less attractive and more costly for various engineering-related reasons, so their improved yield is rather limited. In a sense this is roughly like the economic law of diminishing returns. ***At this time WDM starts to become a management issue, but at best this is used to buy time before the next stage of infrastructure such as a dam needs to be developed***.

The Allocation Phase. This starts to become relevant as basin closure is being reached, and depletion approaches the potentially available water curve. This means that there is limited scope for new infrastructural development, so increased efforts need to be made to increase the productive use of the water. The increasing scarcity of water means that the economic laws of supply and demand start to operate and the value of water rises. ***At this stage allocative efficiency becomes an issue, with the need to start inter-sectoral allocation from lower sectoral value users to higher sectoral value users.*** Managing the demand for water also starts to become a central issue at this time. The institutional focus now changes to the allocation of water between competing users and sectors, the resolution of conflict that now becomes endemic within the river basin, and the regulation

of water supply. Coordination becomes increasingly important involving significant transaction costs. The apportionment of water to different riparian states becomes a key issue in international river basins at this time.

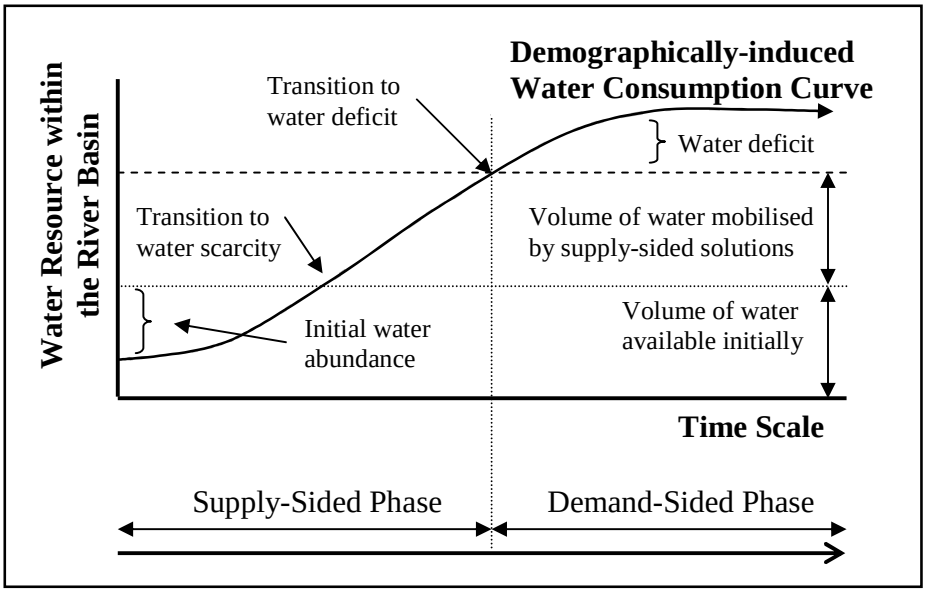

Figure 2. Simplistic model showing transition from Supply-Sided Phase to Demand Management Phase within a given river basin (Turton, 1999a; 2002a; 2002b).

While Molden *et al's.,* (2001) model is helpful in showing how institutional arrangements within a given river basin need to change over time, it does not cast enough light on some important conceptual issues. In order to achieve this, some additional research work has been done with the purpose of developing a more comprehensive model (Turton, 1999a; Turton & Ohlsson, 1999; Lundqvist & Turton, 2001). Central to this work is the need to understand the various transitions that are implicit in the model that has been developed by Molden *et al*., (2001).

The starting point of this refined model as shown in Figure 2 is similar to that of Molden *et al.,* (2001) (Figure 1), but was developed independently of that model. The central need was to understand what social triggers, if any, would become important for institutional development as various phases of water resource management were encountered over time. As such the identification of thresholds would be important, as these would trigger off a new set of institutional needs, which if not met, would result in an increase in conflict potential and a delegitimization of the institution. This model is based on the assumption that it is largely demographic factors that drive the demand for water in a given river basin. This is represented as an "S" curve. There are five important concepts that are central to this model (Turton, 1999a) which need to be highlighted. These are as follows:

- As the demographic base of a given river basin changes over time, there is an increase in the demand for water. In this sense there is a close correlation between

demographic growth and the growth in water demand. As a result, the main curve on the graph is called the "Demographically-Induced Water Consumption Curve" (DIWCC). The word "consumption" is used loosely in the sense that water is used but not really consumed as one would consume a resource like coal, which once ignited would no longer be available for burning as an energy source. Water is consumed but returned to the hydrological cycle in some form or either, either as effluent or as water vapour. The important aspect is that this water is not readily available for direct re-use, so in a loose sense it has been consumed. In reality effluent can be treated, but this adds cost and is normally beyond the capacity of most developing countries to do, resulting in pollution as a significant element in the depletion of a resource-base. Lundqvist (1998) has labeled this phenomenon "hydrocide", which is a manifestation of a specific - and particularly debilitating - second-order resource problem for the developing world in general.

- During the early stages of development within the given river basin, there is an initial period of water abundance. In this sense the term "water abundance" means that the volume of water that is available exceeds the demand for that water. Under such conditions, demand is relatively low, water availability is relatively high and consequently water has a low economic value. This in turn means that the incentive for the abuse of water is high during the early stages of river basin development.

- Economic development takes place, very often having been triggered off by a specific event such as the discovery of gold on the Witwatersrand (Turton & Meissner, 2000), which in turn creates a rapid increase in the demand for water. This forces the DIWCC upwards, to a point where it crosses the horizontal line that represents the volume of water that was available initially. This specific moment in time is known as the transition to water scarcity.

- Water scarcity exists within the given river basin when the DIWCC exceeds the locally available supply of water. The transition to water scarcity results in the birth of the hydraulic mission in society, as politicians seek to mobilize water in order to create a stable infrastructural platform on which future social and economic development can be built. Engineers are commissioned with the task of mobilizing water by means of the development of hydraulic infrastructure. Institutional development that has been created by the transition to water scarcity is similar to the "development" and "utilization" phase of water resource management depicted in Molden *et al's.*, (2001) model. Basin closure is approached, and possibly even reached in this phase of water scarcity. If basin closure is reached, then there is a strong stimulus to augment supply within the given river basin by capturing the resource-base in another river basin by means of an IBT. ***This increases the volume of water that can be mobilized through human ingenuity, thereby enabling water supply to continue even after basin closure has been reached***. This acts as a primary stimulus for resource capture, with direct implications for other downstream riparian states in shared international river basins. This important element of water resource management is not evident in Molden *et al's.*, (2001) model, which presumes that

water is managed within the context of a given river basin with no linkage to other river basins.

- Continued economic development causes water to be mobilized to such an extent that the DIWCC starts to approach, and eventually passes, the maximum volume of water that can be mobilized by supply-sided solutions such as IBTs. This represents the transition to water deficit, beyond which no further water can be mobilized without severe long-term ecological impacts. Under these conditions water can become securitized as the strategic implications of water as a fundamental component of the economic growth potential of the state become apparent (Turton, 2001). ***Institutional development in this phase is centered on water allocation, conflict resolution and the management of demand***, with specific implications for other riparian states in shared international river basins, given the potential impact that resource capture has had on their own resource base.

3. The Concept of Adaptation as a Result of Second-Order Resources

Molden *et al.,* (2001) have shown that water management institutions must adapt over time as river basin closure approaches. It therefore becomes necessary to dwell for a few moments on the dynamics of this adaptive institutional development because ***in reality*** the *problematique* of WDM as a concept and a policy is that ***this adaptation often does not occur, which is why WDM is not being widely applied in Southern Africa***. Haas (1983:57) notes that organizations learn and adapt, which is accomplished via the processing of information and the development of institutionalized knowledge. As such, knowledge creates the basis for cooperation by illuminating complex interconnections that were not previously understood (Krasner, 1983:19). Knowledge is therefore a function of cooperation, which in turn is the foundation of adaptation. Institutionalized knowledge, learning and adaptation are closely linked, but are also different from each other. A critical element of both the Molden *et al.,* (2001) and Turton (1999a) model is the central role that adaptation plays within any institutional arrangement for water management in a closing river basin. The weakness of both these models is that they assume that adaptation will occur, without explaining what the specific elements of adaptation are. This is where the work by Ohlsson (1999) becomes highly relevant (Allan, 2000:323). Ohlsson (1999:5) was initially concerned about the Malthusian-related issues of abundance and scarcity, seen within the context of natural resources and this linkage to human populations. Central to Ohlsson's (1999:23-24) argument is the existence of three distinct forms of scarcity. These are as follows:

- The scarcity of non-renewable resources such as minerals (which generally becomes a scarcity of environmental space over time).
- The scarcity of renewable resources such as water that are used for the production of biomass and food.
- The scarcity of social resources that will be needed by societies to adapt to changing levels of renewable and non-renewable resource scarcity.

These three forms of resource scarcity lie at the very heart of Ohlsson's research work, and have major significance for explaining and predicting the institutional adaptation that is assumed by Molden *et al.,* (2001) and Turton (1999a). It must be noted that social adaptation - or more accurately stated, the lack of appropriate social adaptation - is a central feature of many water-related conflict patterns. This has led Ohlsson (1999:161) to distinguish between two specific types of resource that are relevant to any analysis of resource scarcity. These are as follows:

- A First-Order Resource: is a natural resource such as minerals, land and water, which may be scarce or abundantly available. There are also two distinct types of first-order natural resource, each with fundamentally different characteristics:

    - Non-Renewable Resources: have a finite availability, and once depleted cannot be replaced. One characteristic of these resources is that they are consumed, which is an irreversible process. Typically, consumption of these resources results in a whole series of other problems such as pollution and environmental deterioration, so the management of the resource needs to factor this in.

    - Renewable Resources: are not depleted and therefore are not consumed. Consequently, effective management of these resources can result in continued economic growth over time. The operative word therefore becomes "effective" management, establishing a linkage to second-order resources.

- A Second-Order Resource: is a social resource, which may be either scarce or abundantly available. More appropriately, it is the need that is acutely perceived by societies, administrative organizations and the managers responsible for dealing with first-order natural resource scarcities, to find the societal tools appropriate for dealing with the social consequences of changing levels of first-order scarcities. ***The failure to mobilize the appropriate amount of social resources with which to accomplish institutional transformation and change must be seen as a special form of resource scarcity.***

Seen in this light, Ohlsson (1999) has identified two different discourses on resource scarcity, which he presents graphically as shown in Figure 3. This work represented a substantial shift forward in the way that water resource management could be explained and understood, prompting the author to develop these concepts a little further (Turton, 1999a; Turton & Ohlsson, 1999; Turton, 2002b). The starting point for this development was the model that has been presented in Figure 2. If Ohlsson's (1999) work is valid, then ***there are essentially three phases to water resource management, and consequently three specific focal points of water policy, each necessitating a different institutional arrangement***. This has specific relevance to an understanding of the *problematique* of WDM as a concept and policy, making it central to the logic of the Analytical Paper (Turton, 2002a).

Using the same concepts as those inherent in Figure 3, the assumption was made that water deficit is an unsustainable condition, much like an overdrawn bank account or balance of payment deficit in economic terms. Consequently, if water demand continues above the level of water mobilized by supply-sided solutions, then ecological collapse is likely. This would become a classic type of threshold event, heralding in a non-linear collapse of economies and the social systems that they support. To use Homer-Dixon's (2000:173) terminology, "greater complexity … and a higher chance of nonlinearities tend to boost the number of unknown unknowns in the natural, social, and technological systems around us". If this condition were to be averted, then any policy choice would have to involve the decision to re-align the DIWCC with the sustainability level of engineered water supply. This would change the shape of the "S" curve, and would split the water demand curve from the population growth curve (Ashton & Haasbroek, 2002).

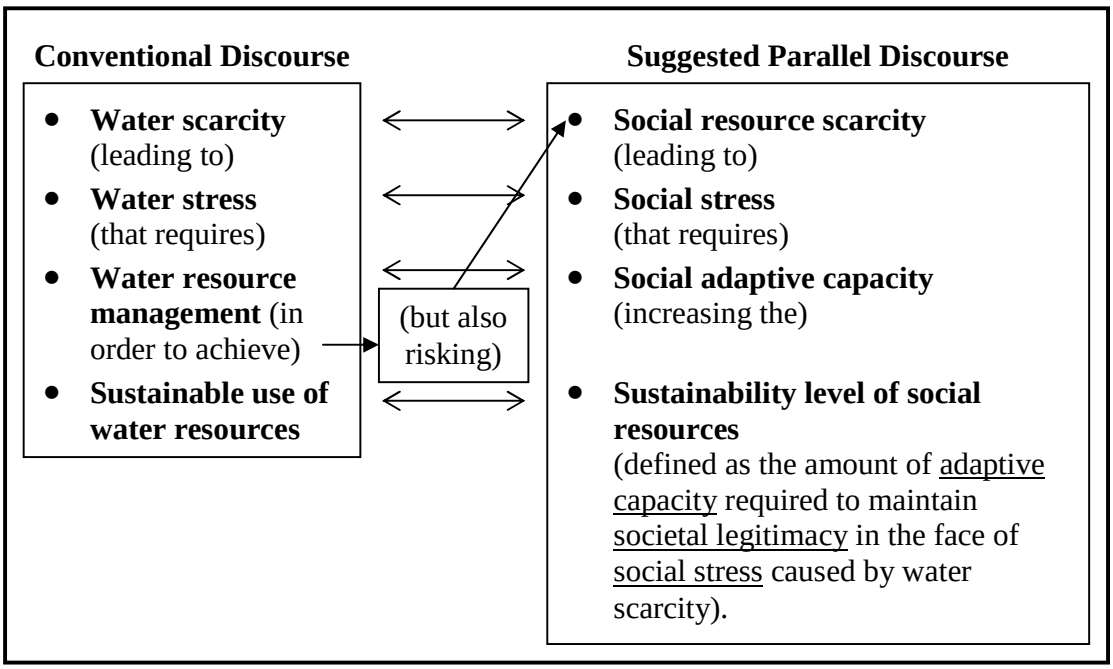

Figure 3. The parallel discourse of First-Order Natural Resource and Second-Order Social Resource Scarcity as depicted by Ohlsson (1999:164).

4. Discussion

From this analysis, ***it becomes evident that there is no single set of policy guidelines that will be universally valid for the entire Southern African situation***. The reason for this is that policy initiatives are specific to a given social, cultural, economic and political setting. This explains why despite the best of intentions, and with the valuable material support from NGOs such as the IUCN, no set of guidelines has been developed. It also shows the approach that has been outlined in the document entitled "An Analytical Paper to Support the Development of WDM Guidelines for the Southern African Region" to be flawed, largely because it is based on the key assumption that the South African and

Namibian experiences with respect to WDM can be replicated elsewhere in the region. This is unlikely to succeed for the host of reasons that have been presented in the Analytical Paper (Turton, 2002a). This does not mean to say that the effort is futile however. Quite the contrary is true. The current IUCN initiative is valuable because it has allowed these complex issues to be analyzed, and in particular, it has allowed for the sharing of the ideas presented in the Analytical Paper (Turton, 2002a) to be critically discussed among water professionals from the entire Southern African Region.

So, if the intention of generating one coherent set of policy guidelines is likely to fail, what can we do to overcome this natural hurdle?

The analysis of the various concepts, theories and models that have been presented above suggest that there are seven strategic issue-areas in which a concerted effort should be made. It is the contention of the author, that by focusing on these key issue-areas, the whole *problematique* of WDM as a concept and a policy can be developed and effectively implemented in Southern Africa. These seven strategic issue-areas are as follows:

Strategic Issue-Area No. 1: Accept that Diversity is the Norm. As the result of our deepening understanding of the conceptual difference between first and second-order resources, we can now explain why each country is different and somewhat unique. This is the fundamental reason why policy options that work in one setting, are likely to fail in another. Each country, river basin or catchment area has a different mixture of first and second-order resources at their disposal. This fact should be recognized and accepted as the primary point of departure in any future attempts to develop regional guidelines.

Strategic Issue-Area No. 2: Focus on Institutional Development. It has been shown that the key problem in Southern Africa is the general failure to effectively develop institutions. This does not mean that there are no institutions, but rather that institutions are generally under pressure. The cause of this is the rising level of complexity that needs to be managed, and in particular the complexity arising from the need to manage demand. This needs a fundamental change to the so-called Paradigm of Perception that forms the very foundation of institutions as they currently exist (Turton, 2002a). We have seen that each country has a different institutional challenge. Some countries have primarily a First-Order Focus (building infrastructure), whereas other countries have primarily a Second-Order Focus (building institutions). Each of these has a fundamentally different logic, rationale and philosophy to it.

Strategic Issue-Area No. 3: Focus on Data Generation, Flow and Management. It has been shown that complexity is a natural outcome of management interventions, particularly with respect to ecosystems. This complexity needs to be modeled if it is to be understood. Central to this is the need for data, which needs to be generated. This is particularly true for WDM, where critical data such as water balances, water loss, payment levels, cost-benefit analyses of alternative options and suchlike are of crucial importance. That data then needs to be managed in some way in order to be processed on time, accurately and then provided to the relevant decision-maker in a format that can be

understood. It is generally known that data management is a weakness in most developing countries, and Southern Africa is no exception.

Strategic Issue-Area No. 4: Focus on the Broader Socio-Economic Setting. It has been shown that policy decisions do not take place in a vacuum. Similarly, it has been shown that complexity results in feedback loops, some positive and some negative. There is consequently an intimate linkage between the policy-making environment and the broader socio-economic setting in which it is embedded. WDM needs both policy generation and sanction for non-compliance if it is to succeed. This is unlikely to occur in a setting where socio-economic development does not allow for the generation of sufficient income streams with which to support institutions, let alone to allow them to adapt to changing needs. The linkage between poverty and second-order resource scarcity is a fundamental one that needs to be taken cognizance of if WDM policies are to be effective.

Strategic Issue-Area No. 5: Focus on Political Will. Because water brings privilege, its allocation in society will always be politicized. As one commentator has noted, "water flows [uphill] towards power and money" (Reisner, 1993: 296). Politicians seek power and generally have a short-term focus (about getting elected), whereas water resource managers generally have a long-term focus. The political environment constrains the water resource management environment however, so there is a distinct difference between what should be done to manage resources sustainably, and what can be done to manage those resources sustainably (Allan, 2000:184). One therefore needs to get political buy-in before WDM policies can become viable. As long as politicians try to seek re-election by offering free water to potential voters, WDM policies will continue to be undermined.

Strategic Issue-Area No. 6: Focus on Windows of Opportunity. A well-documented factor in hydropolitics is what some have called "emblematic events" (Hajer, 1996) and others have called "windows of opportunity" (Kingdon, 1984; Allan, 2000:190). Its relevance is that it provides an opportunity for intense public debate on a given issue, and in general it provides for a narrowing of opinion on a given issue. Windows of opportunity allow for changes to be made in water policy. This is one of the reasons why water policy reform is never uniform, and generally appears as a series of incremental adjustments and adaptations rather than sweeping once-off initiatives. Every effort should be made to concentrate efforts to reform policy at times that coincide with emblematic events. One such opportunity was the Johannesburg Summit (World Summit on Sustainable Development) during which issues of sustainability were examined in detail.

Strategic Issue-Area No. 7: Focus on Incremental Applications of WDM. It has been shown that institutions are capable of learning, and that this learning results in a redefinition of the core problem being managed. This incrementalism is entirely natural and is in fact a healthy manifestation as it allows for corrections to be made before the results become catastrophic. For this reason any initiative designed to stimulate best practices and therefore to develop a set of WDM guidelines should harmonize itself with this natural incrementality rather than seek to make one major effort. In this regard

cognizance can be taken of the different factors raised in the other six strategic issue-areas, particularly with respect to the differing combinations of first and second-order resource availabilities within given countries. This will stimulate the development of sustainable WDM policies, and then encourage the cascading and adaptation of these policies to other countries and social settings.

5. Conclusion

The Analytical Paper (Turton, 2002a) showed that as a result of the dynamics of complexity, the management of water resources actually consists of a series of oscillations between First and Second-Order Resource focal points, which were likened to the turning of a screw. It was shown that complexity increases over time, and that WDM represents yet another layer of management that is superimposed onto an already overburdened set of water management institutions. While the need to manage demand is a manifestation of increased complexity, a new set of complexities are introduced as well, some of which have unintended consequences. Emerging from this is the notion of different phases of water resource management, with three generic phases having been identified (the Supply, Demand and Adaptive Phases); each with a fundamentally different focal point; each representing an increasing level of complexity; and each containing a progressively greater degree of political risk, thereby introducing the importance of legitimacy into the overall management equation. Finally, a set of seven strategic issue-areas were isolated. It is hoped that third-party role-players such as the IUCN and others can use this emerging knowledge in order to select projects where their impact can be maximized.

6. Acknowledgements

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7. Bibliography

Allan, J.A. 2000. *The Middle East Water Question: Hydropolitics and the Global Economy*. London: IB Tauris.

Ashton, P. & Haasbroek, B. 2002. Water Demand Management and Social Adaptive Capacity: A South African Case Study. In **Turton, A.R. & Henwood, R.** (Eds.) 2002. *Hydropolitics in the Developing World: A Southern African Perspective*. Pretoria: AWIRU.

Goldblatt, M., Ndamba, J., van der Merwe, B., Gomes, F., Haasbroek, B. and Arntzen, J. 1999. *Water Demand Management: Towards Developing Effective Strategies for Southern Africa: Phase 1.* Pretoria: The World Conservation Union (IUCN) – South Africa.

Haas, E. 1983. Words can hurt you; or, who said what to whom about regimes. In **Krasner, S.D.** (Ed.) *International Regimes*. Ithaca: Cornell University Press.

Hajer, M. 1996. *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*. Oxford: Clarendon Press.

Homer-Dixon, T.F. 2000. *The Ingenuity Gap*. London: Jonathan Cape.

Kingdon, J. 1984. *Agendas, Alternatives and Public Policies*. New York: Harper-Collins.

Krasner, S.D. 1983. Structural Causes and Regime Consequences: Regimes as Intervening Variables. In **Krasner, S.D.** (Ed.) *International Regimes*. Ithaca: Cornell University Press.

Lundqvist, J. 1998. Avert Looming Hydrocide, in *Ambio,* Vol. 27, No. 6; 428-433.

Lundqvist, J. & Turton, A.R. 2001. Social, Institutional and Regulatory Issues, in *Frontiers in Urban Water Management: Deadlock or Hope*? UNESCO: IWA Publishing.

Molden, D., Sakthivadivel, R. & Samad, M. 2001. Accounting for Changes in Water Use and the Need for Institutional Adaptation. In **Abernethy, C.L**. (Ed.) 2001. *Intersectoral Management of River Basins*. Colombo: International Water Management Institute (IWMI).

Ohlsson, L. 1999. *Environment, Scarcity and Conflict: A Study of Malthusian Concerns*. Department of Peace and Development Research. University of Göteborg.

Reisner, M. 1993. *Cadillac Desert: The American West and its Disappearing Water*. Revised Edition. New York: Penguin.

Seckler, D. 1996. The New Era of Water Resources Management: From "Dry" to "Wet" Water Savings. *IIMI Research Report No. 1*. Colombo, Sri Lanka: International Irrigation Management Institute (IIMI).

Svendsen, M., Hammond Murray-Rust, D., Harmancioglu, N. & Alpaslan, N. 2001. Governing Closing Basins: The Case of the Gediz River in Turkey. In **Abernethy, C.L**. (Ed.) 2001. *Intersectoral Management of River Basins*. Colombo: International Water Management Institute (IWMI).

Turton, A.R. 1999. Water Scarcity and Social Adaptive Capacity: Towards an Understanding of the Social Dynamics of Managing Water Scarcity in Developing Countries. *MEWREW Occasional Paper No. 9*, Water Issues Study Group, School of Oriental and African Studies (SOAS), University of London. Also in the *Proceedings of the Conference entitled Sustainability, Risk and Nature: The Political Ecology of Water in Advanced Societies* that was held at Oxford University on 15-17 April 1999. Available from Website
http://www.soas.ac.uk/Geography/WaterIssues/OccasionalPapers/home.html

Turton, A.R. 2001. Towards Hydrosolidarity: Moving from Resource Capture to Cooperation and Alliances. In *Stockholm International Water Institute (SIWI) Report No. 13, Proceedings of the SIWI Seminar on Water Security for Cities, Food and Environment – Towards Catchment Hydrosolidarity*, Stockholm, August 18, 2001; 19-26. Stockholm: SIWI.

Turton, A.R. 2002(a). WDM as a Concept and a Policy: Towards the Development of a Set of Guidelines for Southern Africa. Commissioned Analytical Paper for the IUCN Water Demand Management Programme for Southern Africa: Phase II. Pretoria: IUCN. Available from Website http://www.up.ac.za/academic/libarts/polsci/awiru

Turton, A.R. 2002(b). The Political Aspects of Institutional Developments in the Water Sector: South Africa and its International River Basins. Unpublished draft of a D.Phil. Thesis. Department of Political Sciences. University of Pretoria.

Turton, A.R. & Ohlsson, L. 1999. Water Scarcity and Social Adaptive Capacity: Towards an Understanding of the Social Dynamics of Managing Water Scarcity in Developing Countries. Paper presented in the Workshop No. 4: Water and Social Stability of the 9th Stockholm Water Symposium "Urban Stability through Integrated Water-Related Management", hosted on 9-12 August by the Stockholm International Water Institute (SIWI) in Sweden. Also available as *MEWREW Occasional Paper No. 18* from Website
http://www.soas.ac.uk/Geography/WaterIssues/OccasionalPapers/home.html

Turton, A.R. & Meissner, R. 2000. Final Report of the Institutional Support Task Team of the Shared Rivers Initiative on the Incomati River. Available from Website http://www.up.ac.za/academic/libarts/polsci/awiru

Wester, P., Burton, M. & Mestre-Rodríquez, E. 2001. Managing Water Transition in the Lerma-Chapala Basin, Mexico. In **Abernethy, C.L**. (Ed.) 2001. *Intersectoral Management of River Basins*. Colombo: International Water Management Institute (IWMI).